W. L. McGRATH.

ENGINE STARTER.

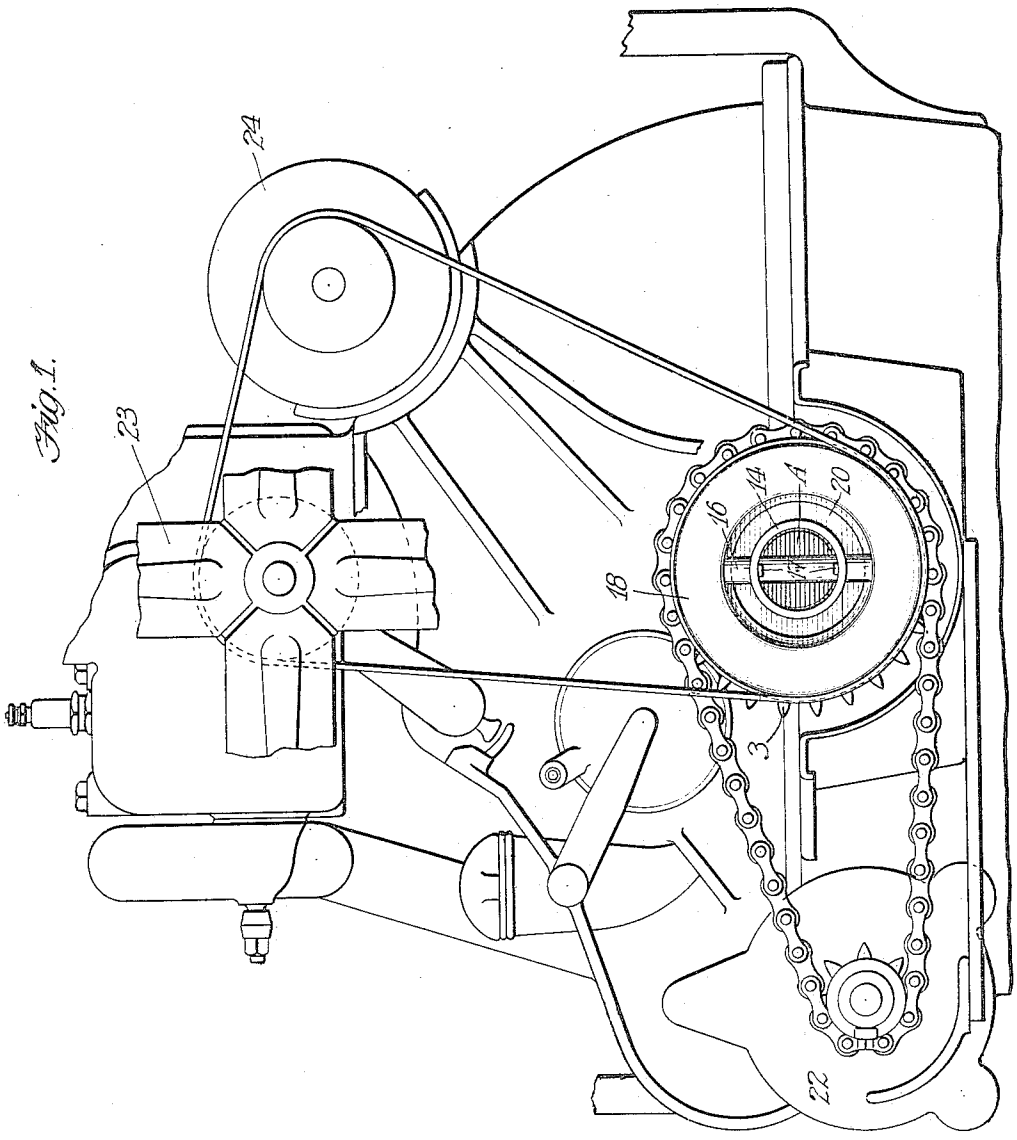
APPLICATION FILED OCT. 29, 1917.

1,288,088.

Patented Dec. 17, 1918.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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3 SHEETS—SHEET 2.

Fig. 2.

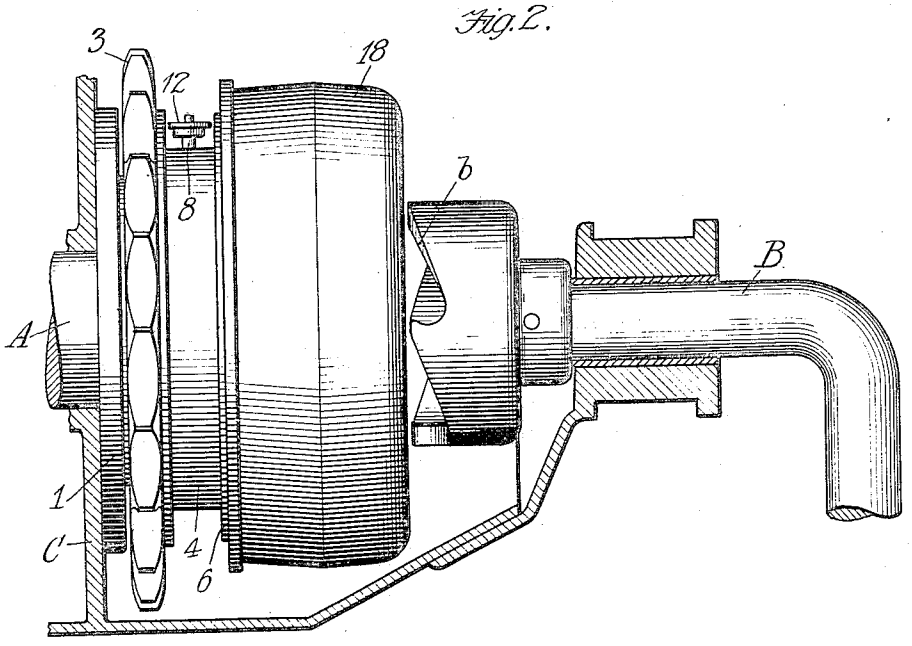
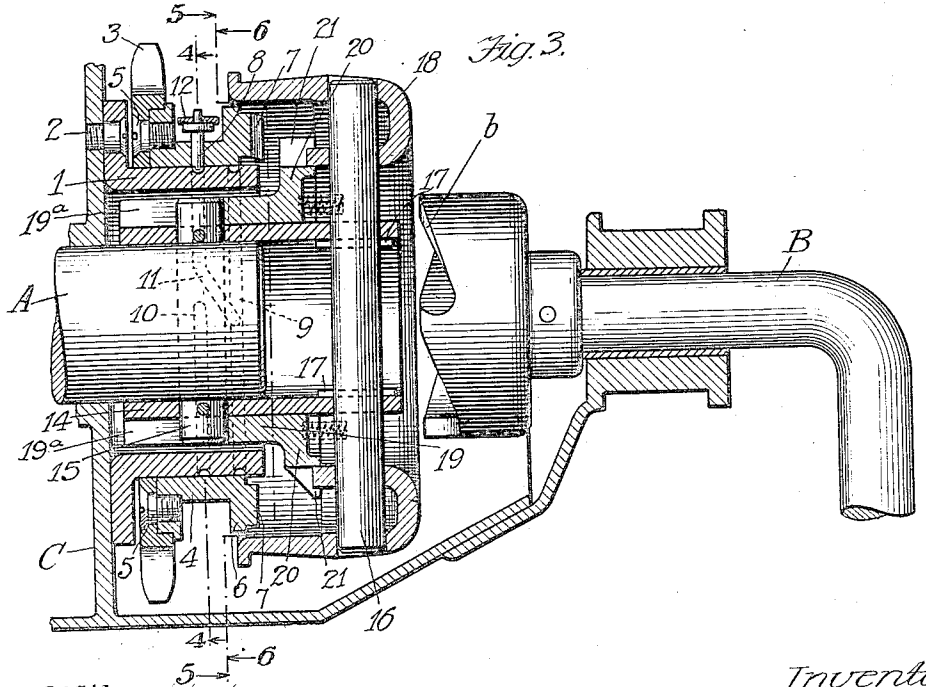


Fig. 3.



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3 SHEETS—SHEET 3.

Fig. 4.

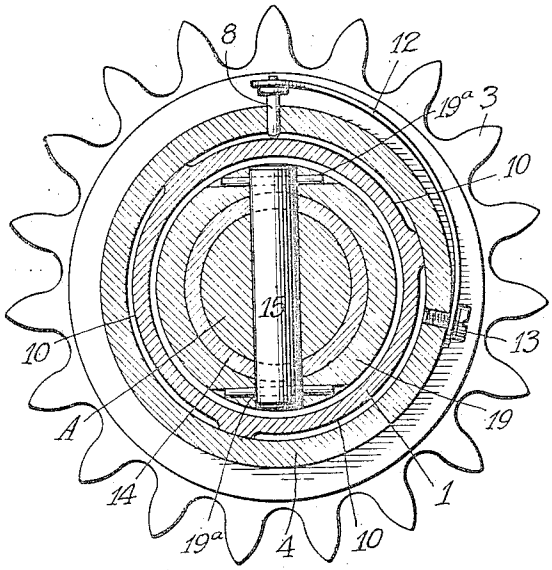


Fig. 5.

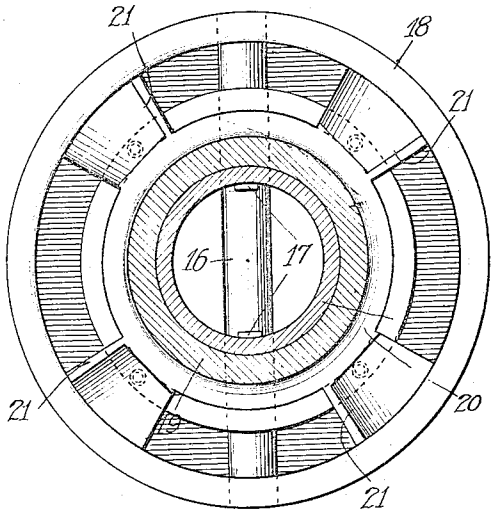


Fig. 6.

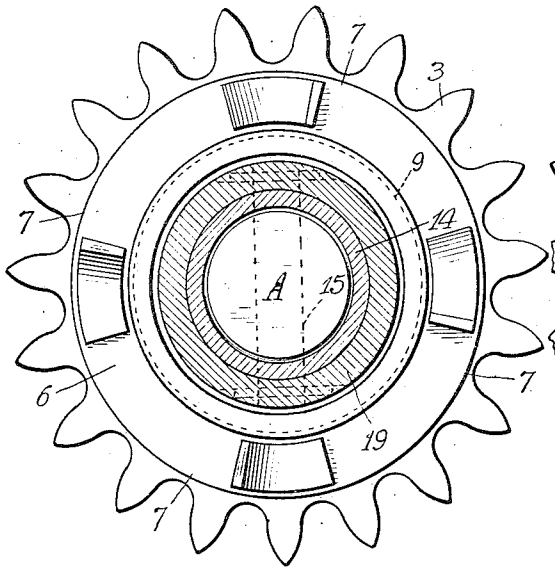
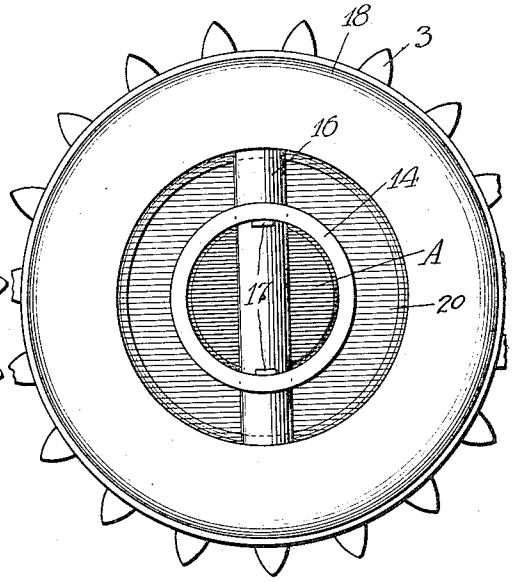


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM L. McGRATH, OF ELMIRA, NEW YORK, ASSIGNOR TO ECLIPSE MACHINE COMPANY, OF ELMIRA, NEW YORK, A CORPORATION OF NEW YORK.

ENGINE-STARTER.

1,288,088. Specification of Letters Patent. Patented Dec. 17, 1918.

Application filed October 29, 1917. Serial No. 198,978.

To all whom it may concern:

Be it known that I, WILLIAM L. McGRATH, a citizen of the United States, residing at Elmira, in the county of Chemung and State of New York, have invented certain new and useful Improvements in Engine-Starters, of which the following is a specification.

My invention relates to engine starters and the object thereof is to provide a simple, efficient and reliable construction of starter capable of working in connection with either a starting motor alone or both a starting motor and a generator. My starter is also so constructed and designed as to be readily applied to internal combustion engines of standard manufacture or those now extensively in use.

In the drawings Figure 1 is a front elevation of my engine starter shown applied to an automobile engine or motor; Fig. 2 an elevation of the starter itself with a portion of the engine frame in section; Fig. 3 a longitudinal section of the starter; Fig. 4 a cross section on the line 4—4 of Fig. 3; Fig. 5 a cross section on a section line in Fig. 3 looking in the direction of the arrows 5—5; Fig. 6 a section taken on the same section line of Fig. 3 but looking in the direction of the arrows 6—6; and Fig. 7 an elevation of the driven wheel.

Referring to the embodiment of my invention as herein shown my starter is applied directly to the crank shaft A of the engine or motor, although it will be understood that it may be applied to or connected with any other rotatable member of or connected with such engine or motor. I have also shown as retained in this construction the usual hand starting crank B having the usual clutch jaw *b* adapted to be operatively connected with the crank shaft in the manner hereinafter described.

As herein shown there is mounted upon a suitable supporting member such as the front plate C of the engine, a flanged plate forming an outstanding or forwardly projecting bearing 1 on which is mounted the driving wheel. This plate or bearing is secured to the plate C in any suitable manner as by means of the screws 2.

The driving wheel is herein the form of a sprocket wheel which may be made integral with its hub portion or may be made in two separate parts as shown, that is, the wheel proper 3 and a hub portion 4, such parts being secured together in suitable manner as by means of the screws 5. The forward end of this hub has a marginal flange 6 whose outer face is provided with clutch means such as the inclined clutch jaws 7.

The driving wheel is mounted on and concentric of the bearing and is capable of both a rotary movement thereon and a longitudinal or axial movement thereof. Means are provided for automatically moving or shifting this driving wheel and its clutch means laterally toward the right in Fig. 3. Such means consists of the pin 8 mounted in and movable radially through the hub 4 and into coöperation with a series of grooves in the bearing 1. There is one continuous peripheral groove 9 and parallel therewith a series of interrupted peripheral grooves 10 connecting with the peripheral groove 9 by inclined or cross grooves 11. The pin is held with a yielding pressure into coöperation with these grooves in any suitable manner as by means of the flat spring 12 secured at one end to the hub by means of the stud 13 and bearing at its other free end upon the pin. In the normal stationary position of the driving wheel the pin 8 is located in one of the grooves 10, but when such wheel is rotated such pin will cause a lateral shifting of the wheel to the right, Fig. 3, inasmuch as it will travel through one of the cross grooves 11 and into the continuous peripheral groove 9. As a result of this action the driving wheel will be brought into driving connection with the engine or motor in the manner about to be described.

Upon the end of the shaft there is secured a sleeve 14 by means of the cross pin 15. This sleeve extends forwardly of the crank shaft and through it passes the large pin 16 held in place by the small pins 17. This large pin also passes through the driven wheel 18 which, in the present instance, is a pulley wheel, thereby securing such driven wheel to the sleeve 14. This large pin is also adapted to be engaged by the clutch jaws *b* of the hand crank.

Mounted concentrically of the sleeve 14 is another sleeve 19 having diametrically opposite end slots 19ª adapted to receive the pin 15, which bottoms in the inner end of such slots. This sleeve 19 is provided at its outer end with the marginal flange 20

on whose inner face there is provided clutch means consisting of clutch jaws 21 complementary to the clutch jaw 7 and adapted to be engaged thereby when the driving wheel is shifted longitudinally in the manner above described, with the result that the power of the driving wheel is transmitted through the sleeve 19 and pin 15 to the crank shaft of the engine or motor.

In the present instance the driven wheel is formed of the peculiar shape and arrangement as shown in order to provide a very compact and self-contained construction. This driven wheel or pulley is practically a ring which is in the shape of a J in cross section, the longer limb thereof forming the pulley face and overhanging said clutch jaws, the clutch jaws 7 moving inwardly within such pulley for engagement with the clutch jaws 21. The other or shorter limb of this pulley may bear against the outer face of the flange 20 to hold the sleeve 19 in place against pin 15, but by preference yielding means such as a series of coiled springs 25 are interposed between said parts 18 and 20 for that purpose.

Describing the operation of my starter and starting with the parts in the position shown in Fig. 3, rotation of the driving wheel 3 will automatically cause a shifting of such wheel and its clutch jaw 7 to the right into engagement with the other clutch jaws 21. The power of the driving wheel will now be transmitted through the flange 20, sleeve 19 and pin 15 to the crank shaft A, or other rotatable part of the engine or some associated part as may be the case. When the engine has started on its own power the excess speed of rotation will cause a retracting movement of the driving wheel by reason of the inclined faces of the clutch jaws, in which movement the pin 8 will move through one of the cross slots 11 or jump directly across from the groove 9 to one of the grooves 10, the rounded lower end of such pin so permitting.

The driving wheel is adapted to be driven by any suitable prime mover such as an electric motor 22, and the pulley or driven wheel is adapted to be connected by a belt to a fan 23 or generator 24, or both. It is obvious that when the engine is running on its own power the driven wheel will be driven by the crank shaft through the pin 15, sleeve 14, and large pin 16.

The interlocking of the pulley 18 and the clutch member 20 is not essential in the structure as illustrated in the drawings, but may be employed as a driving means either with the pulley driving means shown or as a substitute therefor, as, for instance, in case the pin 16 is not utilized as a driving means for the pulley or for hand cranking purposes, in which event such pin would be employed to keep the pulley and also the sleeve 19 in proper position longitudinally. The slot 19a in this sleeve is provided more particularly for convenience in manufacturing and assembling of the parts and obviously holes for the pin 15 would be sufficient, and any means for driving the pulley or for holding it stationarily against longitudinal movement might therefore be employed.

I claim:

1. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, and a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion.

2. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion and a driven wheel connected with the engine member and surrounding the clutch portion of the sleeve.

3. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, and a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion, a second sleeve arranged within the first sleeve and extending forwardly of such member, and a driven wheel secured to such extended end of the sleeve.

4. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, and a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion, a second sleeve arranged within the first sleeve and extending forwardly of such member, a driven wheel concentric of such extended end of the sleeve, and a pin passing transversely through such end of the sleeve and at its ends carrying the driven wheel.

5. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, and a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion, a second sleeve arranged within the first sleeve and extending forwardly of such

member, a driven wheel concentric of such extended end of the sleeve and made in the form of a J-shaped ring, and a pin passing transversely through said sleeve and both limbs of the ring, the longer limb thereof overhanging said clutch faces.

6. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, and a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion, a second sleeve arranged within the first sleeve and extending forwardly of such member, a driven wheel concentric of such extended end of the sleeve and made in the form of a J-shaped ring, and a pin passing transversely through said sleeve and both limbs of the ring, the longer limb thereof overhanging said clutch faces, and the end of the shorter limb bearing against the back of the clutch face portion of the sleeve.

7. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements, said wheel having a hub provided with a clutch face, a sleeve arranged within and concentric of the bearing and secured to said member, said sleeve having a circumferential flange provided with a complementary clutch face in the path of movement of the other clutch face, and a driven wheel operatively connected with said member.

8. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements, said wheel having a hub provided with a clutch face, a sleeve arranged within and concentric of the bearing and secured to said member, said sleeve having a circumferential flange provided with a complementary clutch face in the path of movement of the other clutch face, and a driven wheel operatively connected with said member and having its periphery overhanging said clutch faces.

9. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, and a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion, and means for automatically moving the driving wheel laterally comprising a yielding pin mounted on such driving wheel, said bearing having circumferential and inclined grooves with which such pin coöperates.

10. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, and a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion, said driving wheel having a hub at whose outer end its clutch face is located and said bearing having circumferential and inclined grooves, and means acting in coöperation with such grooves for automatically moving the driving wheel laterally consisting of a yielding pin mounted in said hub and extending therethrough into coöperation with the grooves.

11. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, and a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion, said driving wheel having a hub provided at its outer end with a marginal flange on which its clutch face is located, and said bearing having circumferential and inclined grooves, and means for automatically moving the driving wheel laterally consisting of a yielding pin mounted in said hub and extending therethrough into coöperation with the grooves.

12. In combination with a rotatable member of the engine to be started, a stationary cylindrical bearing, a driving wheel mounted thereon for rotary and lateral axial movements and having a clutch face, and a sleeve arranged within and concentric of the bearing and secured to said member, such sleeve having a complementary clutch face portion, said driving wheel having a hub at whose outer end its clutch face is located and said bearing having circumferential and inclined grooves, and means acting in coöperation with such grooves for automatically moving the driving wheel laterally consisting of a yielding pin mounted in said hub and extending therethrough into coöperation with the grooves, and a flat spring secured at one end to the hub and bearing at its other end upon the pin.

13. In combination with a rotatable member of the engine to be started, a rotatable driving member, a driven member rotatably connected with the engine member, said driving and driven members having complementary clutch elements and one of such members being movable for causing clutching relation between said driving member and driven member and thereby driving the engine, and a driven wheel operatively connected with said driven member.

14. In combination with a rotatable member of the engine to be started, a rotatable driving member, a driven member rota-

tably connected with the engine member, said driving and driven members having complementary clutch elements and one of such members being movable for causing clutching relation between said driving member and driven member and thereby driving the engine, and a driven wheel interlocked with said driven member.

15. In combination with a rotatable member of the engine to be started, a rotatable driving member, a driven member rotatably connected with the engine member, said driving and driven members having complementary clutch elements and one of such members being movable for causing clutching relation between said driving member and driven member and thereby driving the engine, and a pulley having a projecting portion interlocked with said driven member.

16. In combination with a rotatable member of the engine to be started, a rotatable driving member, a driven member rotatably connected with the engine member, said driving and driven members having complementary clutch elements and one of such members being movable for causing clutching relation between said driving member and driven member and thereby driving the engine, and a pulley whose rim is J-shaped in cross-section, the shorter limb of which is interlocked with said driven member.

17. In combination with a rotatable member of the engine to be started, a rotatable driving member, a driven member rotatably connected with the engine member, said driving and driven members having complementary clutch elements and one of such members being movable for causing clutching relation between said driving member and driven member and thereby driving the engine, a driven wheel operatively connected with said driven member, and yielding means interposed between said wheel and driven member.

18. In combination with a rotatable member of the engine to be started, a rotatable driving member, a driven member rotatably connected with the engine member, said driving and driven members having complementary clutch elements and one of such members being movable for causing clutching relation between said driving member and driven member and thereby driving the engine, a driven wheel operatively connected with said driven member, and a series of springs interposed between.

19. In combination with a rotatable member of the engine to be started, a driving member mounted for rotary and lateral axial movements and having a clutch face, a sleeve operatively connected with said engine member and in axial alinement with the driving member, such sleeve having a complementary clutch face, and a driven wheel interlocked with said sleeve.

20. In combination with a rotatable member of the engine to be started, a driving member mounted for rotary and lateral axial movements and having a clutch face, a sleeve operatively connected with said engine member and in axial alinement with the driving member, such sleeve having a complementary clutch face, and a driven wheel in the form of a pulley interlocked with said sleeve and having its rim overhanging said sleeve and clutch face of the driving member.

WILLIAM L. McGRATH.